

PATENT APPLICATION  
PO-7976  
MD-03-30

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

APPLICATION OF )  
WILLIAM E. SLACK )  
SERIAL NUMBER: 10/706,713 ) GROUP NO: 1796  
FILED: NOVEMBER 12, 2003 ) EXAMINER:  
TITLE: STABLE- LIQUID, ALLOPHANATE- ) RABON A. SERGENT  
MODIFIED DIPHENYLMETHANE )  
DIISOCYANATE TRIMERS, )  
PREPOLYMERS THEREOF, )  
AND PROCESSES FOR )  
THEIR PREPARATION )

**REPLY BRIEF**

Commissioner for Patents  
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Sir:

This Reply Brief is in response to the Examiner's Answer dated July 21, 2008.

On page 4, lines 18-24, the Examiner states that the Scholl et al reference discloses:

"... two isocyanate mixtures that meet the MDI isomer composition of all instant claims except for claims 3 and 12, wherein the first specific mixture (identified as Isocyanate mixture 1) contains 62% by weight of 4,4'-MDI, 32% by weight of 2,4'-MDI, and 6% by weight of 2,2'MDI (identified as Isocyanate mixture 1) and the second specific mixture (identified as Isocyanate mixture 3) contains 69% by weight of 4,4'-MDI, 27% by weight of 2,4'-MDI and 4% by weight of 2,2'-MDI". .

Appellant respectfully submits that this is not an accurate description of Isocyanate mixture 1 and Isocyanate mixture 3 of the Scholl et al reference. Both Isocyanate mixture 1 and Isocyanate mixture 3 of this reference contain polymeric MDI. In particular, as Appellant pointed out in his Brief filed May 15, 2008 on page 8,

3<sup>rd</sup> full paragraph therein, Isocyanate mixture 1 contains 10% by weight of polymeric MDI and Isocyanate mixture 3 contains 15% by weight of polymeric MDI. Thus, these two specific isocyanate mixtures of the Scholl et al reference are actually polymethylene poly(phenylisocyanates).

On page 5, lines 21-22, under "Section (10) Response to Argument", the Examiner stated that:

"Appellant argues that one would look only to this single exemplified composition, because the remaining exemplified compositions contain the p-MDI component..." .

It is respectfully submitted that Appellant actually stated that:

"Isocyanate mixture 2 is the only one that is directly comparable with the present invention as it does not contain polymeric MDI." (See page 8 of Appeal Brief filed May 15, 2008, lines 3-4 of the 2<sup>nd</sup> full paragraph.)

Thus, Appellant did not only discuss this single exemplified composition of the Scholl et al reference. Appellant fully addressed the various ranges of MDI isomers and all three of the working examples of this reference on pages 7 to 9 of the Brief filed on May 15, 2008. The fact remains, however, that Isocyanate mixture 1 and Isocyanate mixture 3 of the Scholl et al reference are polymethylene poly(phenylisocyanates) and contain 10% and 15% by weight of polymeric MDI, respectively. Accordingly, these two isocyanate mixtures are less relevant to the present invention than Isocyanate mixture 2 which is 100% of monomeric MDI.

In addition, Appellant also addressed Examples 3, 4, 5, 6, 7, 8, 9 and 10 in Table 1 at columns 5-6 of the Scholl et al reference. See page 9, lines 16-28 (or the 3<sup>rd</sup> and 4<sup>th</sup> full paragraphs on page 9) of the Appeal Brief. It is respectfully submitted from these examples that the Scholl et al reference only teaches "partially trimerized" isocyanates and "partially trimerized" isocyanates which contain some urethane groups. (Also see column 1, lines 64-68; column 2, lines 15-32 and lines 57-61; column 3, lines 23-30 and lines 44-58; column 4, lines 33-58; and Examples 1-11

at columns 5-6.) Allophanate-modified, partially trimerized diphenylmethane diisocyanates are not disclosed by this reference. However, Appellants invention is directed to allophanate-modified, partially trimerized diphenylmethane diisocyanates.

The Examiner, however, continued by stating that:

“... appellant has essentially ignored the general teachings within Scholl et al. with respect to the ranges of MDI isomers that may be present and, because appellant believes that his claims exclude p-MDI, appellant has based his response almost exclusively on a single exemplified isomer composition that is not within the scope of the claims.” (See page 6, lines 2-6 of the Examiner’s Answer dated July 21, 2008.)

Appellant respectfully submits that this is simply not accurate. The Brief filed by Appellant on May 15, 2008 fully discusses the various ranges of MDI isomers and all three of the working examples of the Scholl et al reference. See pages 7-9 of Appellant’s Brief. As set forth above, Appellant also addressed Examples 3-10 in Table 1 of this reference.

It is further submitted that the Examiner is ignoring the express disclosure of the examples (particularly Isocyanate mixture 1 and Isocyanate mixture 2) of the Scholl et al reference and attempting to make these compositions 100% monomeric MDI by ignoring the presence of the polymeric MDI therein. It is evident that one can not simply omit a component from a composition. This is, however, the approach taken by the Examiner.

Appellant further notes that the above statement is evidence that the Examiner clearly agrees that Isocyanate mixture 2 of the Scholl et al reference is not within the scope of the claims. However, Isocyanate mixture 2 is the only isocyanate mixture in the examples of this reference which does not contain polymeric MDI.

The Examiner further states in the paragraph bridging pages 6-7 of his Answer that:

“[S]ince appellants’ arguments are heavily based upon an improper interpretation of the claims, no meaningful weight can be given to appellant’s arguments that fail to address relevant teachings of Scholl et al. Furthermore, it is well established that a reference is good for all it teaches;

therefore, appellant's failure to consider or address additional exemplified embodiments and the disclosed general ranges of MDI isomer contents disclosed by Scholl et al, that are within the instantly claimed ranges is improper and fails to provide a complete response to the rejections and issues at hand."

Appellant simply has a different interpretation of the claims and of the Scholl et al reference than the construction offered by the Examiner. This does not mean, however, that Appellants' arguments are meaningless, that Appellant has not addressed the relevant teachings of the Scholl et al reference, that Appellant has failed to address additional exemplified embodiments of the Scholl et al reference, and/or that Appellant has not provided a complete response to the rejections and issues at hand. It simply means that Appellant has a different position and opinion than the position and opinion of the Examiner.

It is further stated by the Examiner on page 7, lines 5-11 of the Examiner's Answer that:

"...appellant's calculations and conclusions are incorrect in that they are based upon an incorrect interpretation of the reference. Appellant's argued isomer content when p-MDI is present in incorrect; appellant has based his calculations on p-MDI being present in an amount of 20% by weight; however, the contents set forth within the abstract and column 2 of Scholl et al are based solely on the diphenylmethane diisocyanate isomers and not on the presence of any other component, such as p-MDI. A careful reading of Scholl et al. bares this out."

This is clearly incorrect. Appellant respectfully submits that his calculations and conclusions are correct as stated in the May 15, 2008 Appeal Brief. Appellant's interpretation of the Scholl et al reference corresponds to how one of ordinary skill in the art would understand and interpret this reference. It is apparent the Examiner is misinterpreting and/or misreading the Scholl et al reference.

In particular, in the abstract and at column 2, lines 17-27, the Scholl et al reference expressly discloses:

“... polyisocyanate mixture of the diphenyl methane series contains 80 to 100% by weight diisocyanato diphenyl methane isomers and 0 to 20% by weight higher than difunctional polyisocyanates of the diphenyl methane series, 40 to 80% by weight of the diisocyanatodiphenyl methane isomers consisting of 4,4'-diisocyanatodiphenyl methane, 20% to 60% by weight of 2,4'-diisocyanatodiphenyl methane and 0% to 8% by weight of 2,2'-diisocyanatodiphenyl methane and the percentages shown adding up to 100”. (Emphasis added.)

Appellant respectfully submits that it is evident from the above language that his calculations and conclusions are correct and accurate. The Board's attention is directed to the language “... 40 to 80% by weight of the diisocyanatodiphenyl methane isomers consisting of 4,4'-diisocyanatodiphenyl methane”. (Emphasis added.) This is clearly referring back to the “80 to 100% by weight diisocyanato-diphenyl methane isomers”. Thus, the 4,4'-MDI content is 40 to 80% of the 80 to 100% of total monomeric MDI, which corresponds to 32 to 80% by weight of 4,4'-MDI. Likewise, the 2,4'-MDI content is 20 to 60% of the 80 to 100% by weight diisocyanatodiphenyl methane isomers, which corresponds to 16 to 60% by weight of 2,4'-MDI. Finally the 2,2'-MDI content is 0 to 8% by weight of the 80 to 100% by weight of diisocyanatodiphenyl methane isomers, which corresponds to 0 to 8% of 2,2'-MDI. This is exactly what Appellant stated in his Appeal Brief filed on May 15, 2008, on page 7, lines 26-29.

It is evident from the above that Appellant has given the Scholl et al reference the broadest possible interpretation which is consistent with how one of ordinary skill in the art would interpret this reference as disclosing.

In the paragraph bridging pages 7-8 of the Examiner's Answer dated July 21, 2008, it was stated that:

“...appellant has directed the Board's attention to Example 18 and 19 of the specification. The examiner has considered these examples; however, their relevance to the issues at hand is unclear. The examples are argued to show that non-allophanate containing trimerized compositions produced from only MDI monomer having a content of 2,4'-MDI of less than

38% are not stable liquids. These examples do not contain allophanate groups and are not representative of the instant invention; furthermore, given the difference in catalyst selection, presence of polyol, and presence of p-MDI between these examples and the examples of Scholl et al., it is not clear that these examples are representative of Scholl et al. or are fairly comparable to Scholl et al. Accordingly, it cannot be determined how these examples can be construed to support patentability of the instant invention or to justify removal of the Scholl et al. reference.”

Appellant explained Examples 18 and 19 in the 1<sup>st</sup> and 2<sup>nd</sup> full paragraphs on page 10 of the Appeal Brief filed May 15, 2008. It is respectfully submitted that it is evident that these two examples (Examples 18 and 19) are not representative of the presently claimed invention as these clearly do not contain any allophanate groups. The products formed in these two examples are only partially trimerized products, and thus, are similar to those of the Scholl et al reference.

The purported difference in catalyst selection is minimal at best. Appellant directs the Board’s attention to the description of Catalyst A on page 30, lines 11-12 of the present application, and the detailed description of trimerization catalysts in the specification at page 18, line 12 through page 19, line 9. The same general categories of trimerization catalysts are disclosed by Scholl et al at column 2, lines 57-61 and in the examples at column 4, lines 35-58.

Neither Example 18 or 19 of the present application contain a polyol. Thus, these are directly comparable to Example 2 at column 5, lines 29-40 and Examples 5 and 7 in Table 1 at columns 5-6 of the Scholl et al reference as these three examples also do not contain a polyol. Accordingly, there is no difference in catalyst or the presence of a polyol which would make a comparison between Examples 18 and 19 with the Scholl et al reference improper.

Finally, Examples 18 and 19 of the present application do not contain any polymeric MDI. Example 7 in Table 1 of the Scholl et al reference also does not contain any polymeric MDI, but the isocyanate mixtures used in Examples 2 and 5 both contain polymeric MDI. Appellant notes that up to this point, the Examiner has taken the position that one can simply omit or ignore the portion of polymeric MDI that is present in these two isocyanate mixtures (Isocyanate mixture 1 and

Isocyanate mixture 3). It appears that now, however, the Examiner suddenly changes course and wants the Board to believe that a proper comparison can **not** be made between Examples 18 and 19 (which do not contain polymeric MDI) and **any portion** of the Scholl et al reference, including those which the Examiner has previously urged as reading on the ranges of MDI isomer in the present application! Appellant respectfully submits that the Examiner can not interpret the reference two different ways, and then rely on the interpretation that supports his position at a given time. This is clearly improper! A consistent construction of the Scholl et al reference should be given and relied upon consistently by the Examiner.

As previously stated, Example 18 and Example 19 of the present application do not contain polymeric MDI and did not use a polyol. The absence of a polyol indicates that allophanate groups were not formed. Catalyst A, the catalyst used in both of these examples, is a trimerization catalyst (see page 30, lines 11-12 of the present application).

Example 18 used a blend of 100 parts of MDI-1 and 100 parts of MDI-2 (see page 33, lines 5-12). Example 19 used a blend of 60 parts of MDI-1 and 140 parts of MDI-2 (see page 33, lines 14-17). The definitions of MDI-1, MDI-2 and Catalyst A on page 30, lines 1-9 and 11-12 of the present application.

In Example 18, a blend of 100 parts of MDI-1 and 100 parts of MDI-2 yields an isocyanate component having a 4,4'-MDI content of slightly more than 72%, a 2,4'-MDI content of slightly more than 27% and a 2,2'-MDI content of slightly less than 1%. This is readily calculated by one skilled in the art. For example, MDI-1 contains 98.4 parts of 4,4'-MDI and MDI-contains 45.8 parts of 4,4'-MDI for a total of 144.2 parts in 200 parts of the total blend. Dividing 144.2 by 200, yields 0.721 which is then multiplied by 100% to give 72.1% of 4,4'-MDI. The 2,4'- isomer contents and 2,2'-isomer contents are calculated similarly.

Example 19 was a blend of 60 parts by weight MDI-1 and 140 parts by weight of MDI-2. This blend contained slightly less than 62% of 4,4'-MDI, slightly more than 37% of 2,4'-MDI and slightly less than 1% of 2,2'-MDI. The calculation in Example 19 is more complex due to the fact that it was not a blend of equal parts of MDI-1 and MDI-2, and this must be taken into consideration. Of the 60 parts of MDI-1, 98.4% was 4,4'-MDI which is about 59 parts; and 1.6% is 2,4'-MDI which is about 1 part. Of

the 140 parts of MDI-2, 45.8% is 4,4'-MDI which equal about 64 parts; 52.8% is 2,4'-MDI which is about 74 parts; and 1.4% is 2,2'-MDI which is about 2 parts. Thus, the total amount of 4,4'-MDI in the blend is the sum of 59 plus 64 which equals 123 parts; the total amount of 2,4'-MDI in the blend is the sum of 1 plus 74 which equals 75 parts; and the sum of 2,2'-MDI in the blend is about 2 parts. To convert this to a percentage basis, for 4,4'-MDI, divide 123 by 200 which yields about 0.615, and multiply this by 100% to yield 61.5%. For 2,4,-MDI, divide 75 by 200 which yields 0.375, and multiply this by 100% to yield 37.5% of 2,4'-MDI. Finally, dividing 2 by 200 yields 0.01, and multiply 0.01 by 100% to yield 1% of 2,2'-MDI.

For simplicity, Appellant has inserted the following table (TABLE A) showing various details, including the monomer distribution, for Examples 18 and 19.

TABLE A:

<b>Composition:</b>	<b>Example 18</b>	<b>Example 19</b>
MDI-1	100 parts by wt.	60 parts by wt.
MDI-2	100 parts by wt.	140 parts by wt.
<b>Isomer Distribution:</b>		
4,4'-MDI (%)	72%	61.5%
2,4'-MDI (%)	> 27%	37.5%
2,2'-MDI (%)	< 1%	1%
<b>Polymeric MDI:</b>	0	0
<b>Results:</b>		
	30.6% NCO	30.6% NCO
<b>Storage @25°C</b>	turbid with 15% solids	turbid with 10% solids
	29.6% NCO	29.6% NCO
<b>Storage @25°C</b>	turbid with 15% solids	turbid with 10% solids

Also for convenience, the following table (TABLE B) shows the teachings of the Scholl et al reference as stated above by Appellant and the interpretation of this reference according to the Examiner.

TABLE B:

PMDI	U.S. 5,124,370 (Appellants' broadest interpretation)	U.S. 5,124,370 (Examiner's interpretation*)
4,4'-MDI	32 to 80%	40 to 80%
2,4'-MDI	16 to 60%	20 to 60%
2,2-MDI	0 to 8%	0 to 8%
Polymeric MDI	0 to 20%	0%

\* Appellant's understanding of the Examiner's interpretation

Appellant respectfully submits that it is evident from TABLE A and TABLE B that regardless of which interpretation of the Scholl et al reference is correct, that the monomeric MDI distribution in Examples 18 and 19 of the present application fall within the scope of monomeric MDI distribution in the Scholl et al reference.

Examples 18 and 19 of the present application are evidence of the shortcomings of the teachings of the Scholl et al reference. These two examples illustrate that stable, liquid, partially trimerized isocyanates can not be prepared from the broad range of MDI isomers that is disclosed by Scholl et al.

In Example 18, a partially trimerized MDI was forming which had an NCO group content of 30.6%. Upon storage at 25°C, this product became turbid with about 15% solids. At an NCO group content of 29.6%, the same result occurred upon storage at 25°C. (See page 33, lines 5-12 of the present application.) Likewise, Example 19 formed a partially trimerized MDI having an NCO group content of 30.6%. Upon storage at 25°C, this product became turbid with about 10% solids. At an NCO group content of 29.6%, the product also became turbid and formed solids upon storage at 25°C. (See page 33, lines 14-17 of the present application.)

It is readily apparent that the present invention results in liquid products that are storage-stable. As set forth on page 13, lines 2-7 of the present application, the definition of "liquid" means that the partially trimerized, allophanate-modified MDI product does not precipitate solids when stored at 25°C for 3 months. The term "storage-stable" means that the partially trimerized, allophanate-modified MDI product has up to a 1% absolute change in the %NCO content and up to a 10% change in the viscosity when stored at 25°C for 3 months. By comparison, Examples 18 and 19 do not form stable liquid, partially trimerized products. These two examples (in combination with Example 7 in Table 1 of the Scholl et al reference) clearly demonstrate that partially trimerized products that are stable liquids can not be prepared from monomeric MDI having a 2,4'-MDI isomer content of less than about 38%.

As previously pointed out, only Example 7 of this reference which uses Isocyanate mixture 2 is 100% monomeric MDI. The 2,4'-MDI isomer content in Isocyanate mixture 2 is 52-53% by weight. Appellant's' Claim 1 permits no more than 40% of 2,4'-MDI, and Appellant's' Claim 3 permits no more than 35% of 2,4'-MDI.

Both claimed ranges are well below that which is disclosed by the Scholl et al reference as a suitable monomeric MDI composition for forming a stable liquid partially trimerized product.

Appellant submits that Examples 18 and 19 of the present application provide direct evidence that one of ordinary skill in art could not and would not reasonably expect that the broad range of MDI isomers disclosed by the Scholl et al reference are suitable for preparing liquid products as defined in the present specification. Examples 18 and 19 clearly demonstrate that these two isocyanates which contain only monomeric MDI do not form stable liquid partially trimerized products. Accordingly, there is no logical or reasonable basis for the skilled artisan to expect or conclude that the range of MDI isomers from the Scholl et al reference could be used to form stable liquid partially trimerized, allophanate-modified products as claimed by Appellant.

It is respectfully submitted that in view of the above discussion of Examples 18 and 19, the relevance of these examples to the patentability of the present invention is evident. It is also readily apparent that Examples 18 and 19 are directly comparable to the broad scope of the Scholl et al reference. The purported differences between these Examples and the Scholl et al reference as identified by the Examiner are non-existent.

Appellant respectfully submits that it is therefore apparent that Claims 1-2, 4-11 and 13-18 are not properly rejected as being obvious under 35 U.S.C. § 103(a) in view of the various combinations of references cited by the Examiner.

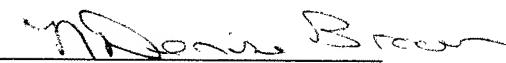
Finally, in the paragraph bridging pages 8-9 of the Examiner's Answer dated July 21, 2008, it was stated that:

“... the examiner takes the position that the responses to appellant's arguments with respect to the references as well as argued Examples 18 and 19, previously set forth, also apply to these claims. Secondly, the examiner agrees that the specifically exemplified isomer blends of Scholl et al. are outside the scope of these claims, however, the isomer blends of claims 3 and 12 continue to fall squarely within the general diisocyanatodiphenyl methane isomer blends set forth within the abstract and column 2 of Scholl et al.”

In response, Appellant respectfully relies on the preceding arguments. It is evident from the above arguments, particularly those pertaining to the relevance of comparative Examples 18 and 19 of the present application, that it is not obvious to one of ordinary skill in the art to use the MDI isomer mixtures of the Scholl et al reference to make partially trimerized, allophanate-modified isocyanate products that are stable liquids. This is apparent as comparative Examples 18 and 19 illustrate that stable liquid, partially trimerized isocyanate products can not be made from monomeric MDI containing less than 38% of 2,4'-MDI. Thus, there is no logical reason why one skilled in the art would expect to be able to prepare a partially trimerized, allophanate-modified, liquid MDI product as presently claimed from the monomeric MDI compositions of Claims 3 and 12. Claims 3 and 12 of the present application require the 2,4'-MDI content to be from 20 to 35% by weight. Accordingly, Claims 3 and 12 are not properly rejected as being obvious over this combination of references.

In view of the above, Appellant maintains the positions as set forth in his Appeal Brief that the rejection of Claims 1-18 as being obvious under 35 U.S.C. § 103(a) in view of the various combinations of references is in error. It is respectfully requested that the rejection be reversed and Claims 1-18 be allowed.

Respectfully Submitted,

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